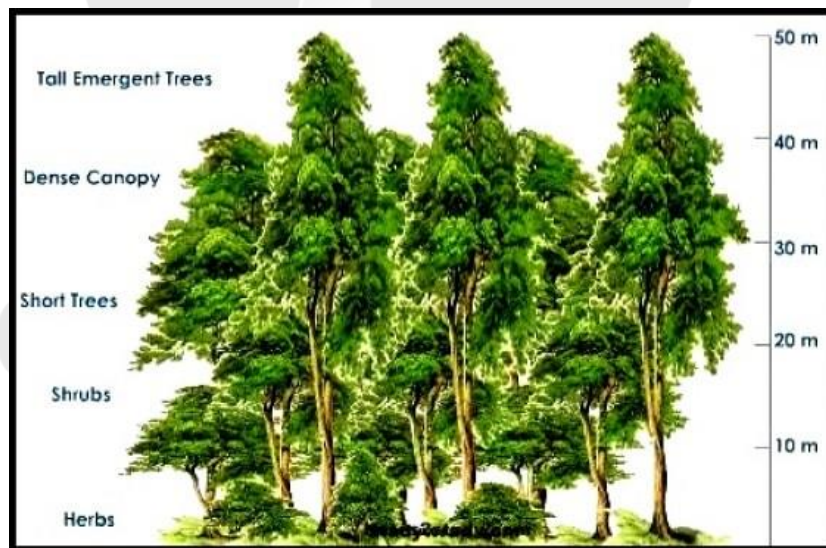


Forests – Natural Vegetation of India



Definition of Forest

- At present, in India, there is no clear nationally-accepted definition of ‘forest’.
- States are responsible for determining their definition of forests.
- The prerogative of the states to define forests stems from a 1996 Supreme Court order called the T.N. Godavarman Thirumulkpad vs the Union of India judgment.
- In the judgement, the Supreme Court interpreted that the word “forest” must be understood according to its “dictionary meaning”.
- This description covers all statutorily recognised forests, whether designated as reserved, protected or otherwise.

Constitutional Provisions:

- Forests are included in the Concurrent List in the (Seventh Schedule) of the Constitution of India.
 - Through the 42nd Amendment Act, 1976 Forests and Protection of Wild Animals and Birds were transferred from State to Concurrent List.
 - Article 51 A (g) of the Constitution states that it shall be the fundamental duty of every citizen to protect and improve the natural environment including forests and Wildlife.
 - Article 48 A in the Directive Principles of State policy, mandates that the State shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country.
- India’s forests are currently governed by the National Forest Policy, 1988 which has environmental balance and livelihood at its centre.
 - The Wildlife Protection Act of 1972, The Environment Protection Act of 1986, and The Biodiversity Protection Act of 2003.

Classification of Forests On Administration-Basis

Reserved Forests	Protected Forests	Unprotected Forests
•Under direct supervision of the Government.	•Looked after by the government.	•Unclassified Forests.
•No public entry allowed for the commercial purpose of cattle grazing.	•Local people are allowed to collect forest produce and cattle grazing without causing any serious damage.	•No restriction on cutting trees or grazing cattle.
•53% of the Total Forest Area (TFA) of the country under this category.	•Occupy about 29% of the TFA.	•Occupy 18% of the TFA.

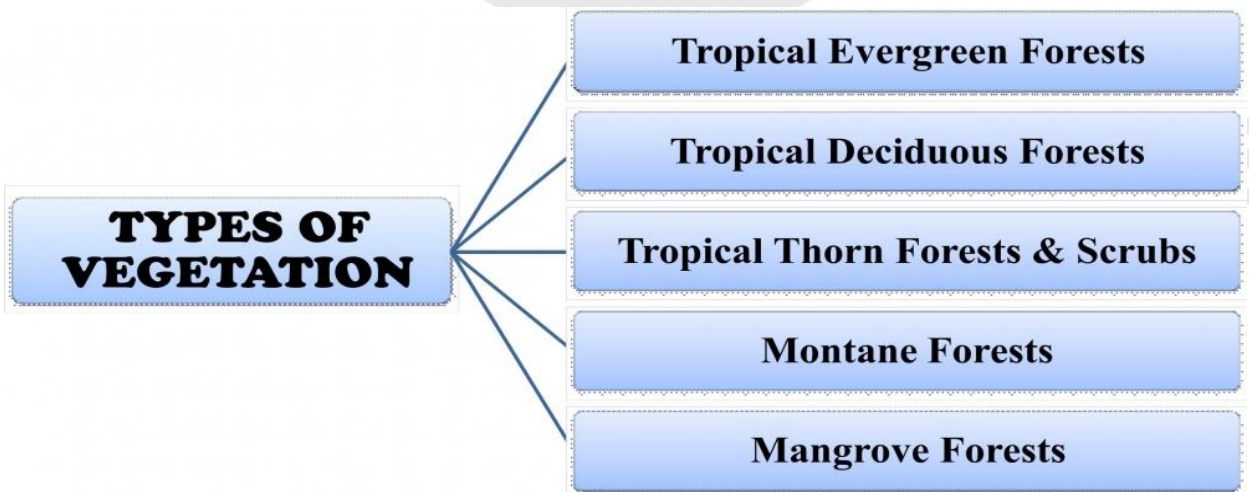
Classification as per Constitution of India

State Forests	Commercial Forests	Private Forests
•Include almost all important forest areas of the country and are under full control of the government (state/central).	•Owned and administered by local bodies (municipal corporations, village panchayats, district boards etc.)	•Under private ownership.
•Cover almost 94% of the TFA.	•Cover 5% of the TFA.	•Cover slightly more than 1% of the TFA.

Based on Composition

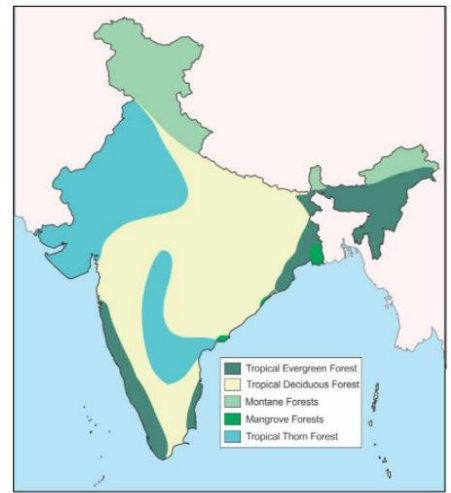
Coniferous Forests	Broad-Leaf Forests
•Temperate Forests	•Tropical and subtropical monsoon forests.
•Found in middle and upper elevations of the eastern Middle Himalayas and N-E Indian states like Arunachal Pradesh.	•Found in the plateaus, plains and mountainous areas of the country.
•Cover 6.50% of the TFA of the country.	•Cover about 94% of the TFA of the country.

Based on Average Annual Rainfall



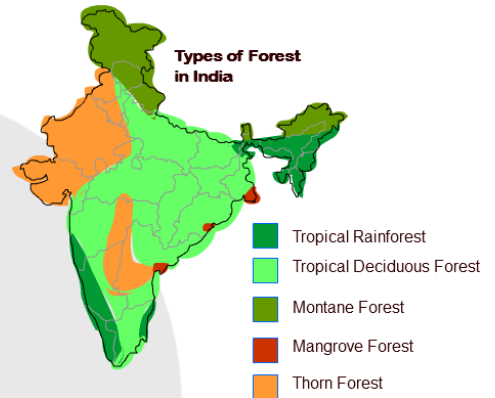
Tropical Evergreen Forests

Annual Rainfall	Type of Vegetation
200 cm or more	Evergreen Rain Forests
100 to 200 cm	Monsoon Deciduous Forests
50 to 100 cm	Drier Deciduous or Tropical Savanna
25 to 50 cm	Dry Thorny Scrub (Semi-arid)
Below 25 cm	Desert (Arid)



Map showing the distribution of natural vegetation in India

- Temperature is the major factor in Himalayas and other hilly regions with an elevation of more than 900 metres.
- As the temperature falls with altitude in the Himalayan region the vegetal cover changes with altitude from tropical to sub-tropical, temperate and finally alpine.
- Soil is an equally determining factor in few regions. Mangrove forests, swamp forests are some of the examples where soil is the major factor.



- **Moist Evergreen Forests:**
- Region: Found in southern India along the Western Ghats, Andaman and Nicobar Islands and north-eastern region.
- Climatic Conditions: Found in warm and humid areas with an annual precipitation of over 200 cm and mean annual temperature above 22°C.
- Trees: In these forests, trees reach great heights up to 60 m or above.
- There is no definite time for trees to shed their leaves, flowering and fruition; these forests appear green all the year round.
- Species found in these forests include Rosewood, Mahogany, Aini, Ebony, etc.
- The more common trees that are found here are the jackfruit, betel nut palm, jamun, mango, and hollock.

- **Semi Evergreen Forests:**
- Region: Found in the less rainy parts of the regions where moist evergreen forests are found; Western Ghats, Andaman and Nicobar Islands, and the Eastern Himalayas.
- Trees: Such forests have a mixture of moist evergreen and moist deciduous trees.
- Main species are white cedar, hollock and kail.



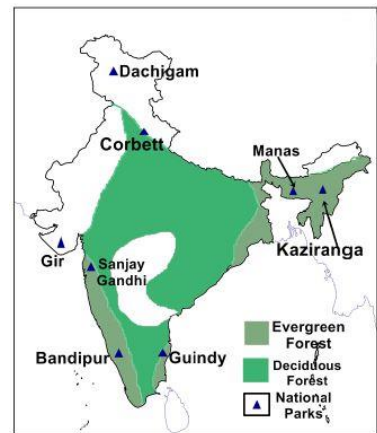
Copyright © Robert O'Brien

- **Dry evergreen:**
- Region: Found in the Shivalik Hills and foothills of the Himalayas up to a height of 1000 metres in the north.
- Found along Andhra Pradesh and Karnataka coast in the south.
- Climatic Conditions: Usually have a prolonged hot and dry season and a cold winter.
- Trees: Have mainly hard-leaved evergreen trees with fragrant flowers, along with a few deciduous trees.
- Some of the more common ones are the pomegranate, olive, and oleander.

Tropical Deciduous Forests (Monsoon Forests)

• Moist Deciduous Forests:

- **Region:** These forests are found in the north-eastern states along the foothills of Himalayas, eastern slopes of the Western Ghats and Odisha.
- **Rainfall:** Found in the regions which record rainfall between 100-200 cm.
- **Trees:** Tall trees with broad, branched trunks.
- Some of the taller trees shed their leaves in the dry season.
- Teak, sal, shisham, hurra, mahua, amla, semul, kusum, and sandalwood etc. are the main species of these forests.

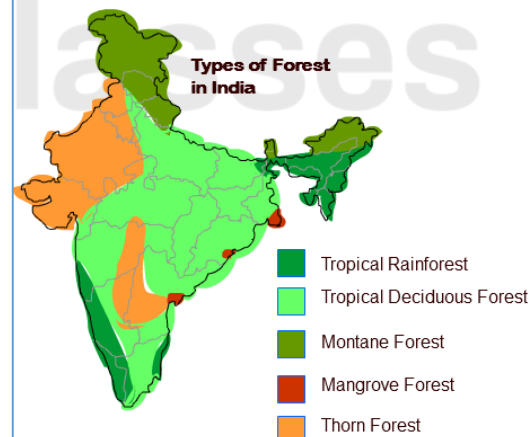


• Dry Deciduous Forests:

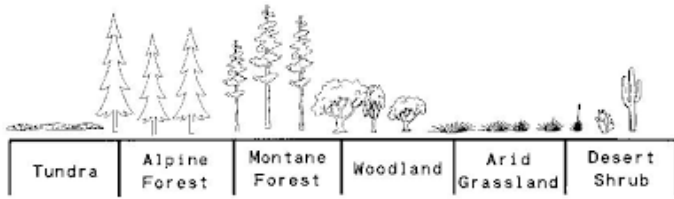
- **Region:** Found throughout the northern part of the country except in the north-east.
- Also found in Madhya Pradesh, Gujarat, Andhra Pradesh, Karnataka, and Tamil Nadu.
- **Rainfall:** Covers vast areas of the country, where rainfall ranges between 70 -100 cm.
- **Trees:** As the dry season begins, the trees shed their leaves completely and the forest appears like a vast grassland with naked trees all around.
- Tendu, palas, amaltas, bel, khair, axlewood, etc. are the common trees of these forests.

Thorn Forests

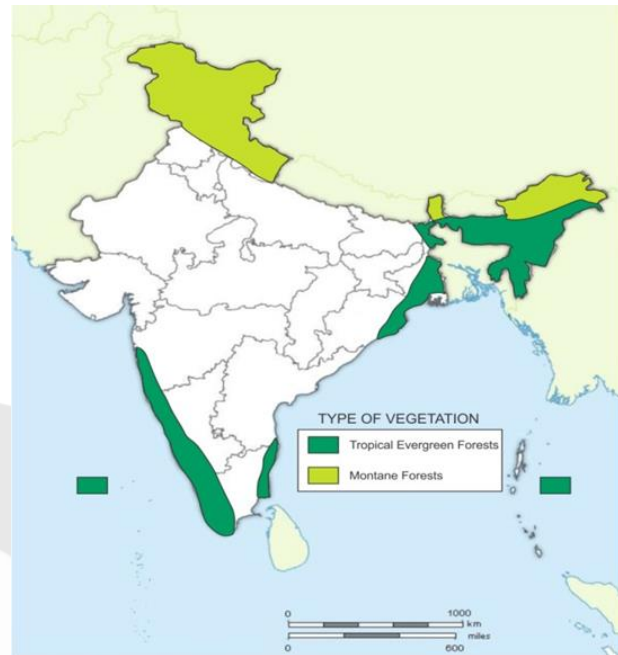
- **Rainfall:** The forests occur in the areas that receive annual rainfall less than 50cm.
- **Regions:** This type is found in areas with black soil: North, West, Central, and South India.
- Includes semi-arid areas of south west Punjab, Haryana, Rajasthan, Gujarat, Madhya Pradesh and Uttar Pradesh.
- **Trees:** The trees do not grow beyond 10 metres and consist of a variety of grasses and shrubs. caper, and cactus are typically found in this region.
- The plants remain leafless for most part of the year.
- Babul, Acacia, Kokko, Khair, Khajuri, Ber, Neem, Khejri, Palas, etc. are common species of the forests.



Montane Forests



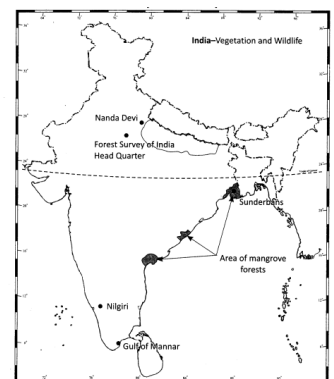
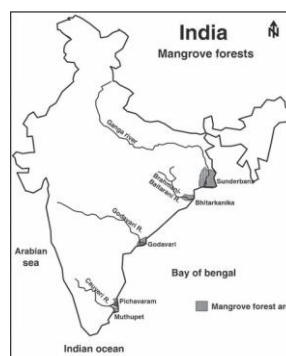
- **Montane Wet Temperate Forests:**
- **Region:** Occur in the northern and southern India.
- In the North, it is found in the region to the east of Nepal into Arunachal Pradesh, at a height of 1800–3000 metres, receiving a minimum rainfall of 200 cm.
- In the South, it is found in parts of the Nilgiri Hills, the higher reaches of Kerala.
- **Trees:** The forests in the northern region are denser than in the South.
- This is because over time the original trees have been replaced by fast-growing varieties such as the eucalyptus.
- Rhododendrons, Champa and a variety of ground flora can be found here.



- **Montane Subtropical Forests:**
- **Climatic Conditions:** Found in the region where average rainfall is 100-200 cm and temperature varies between 15°C to 22°C.
- **Region:** Found in north-western Himalayas (except Ladakh and Kashmir), Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh.
- **Trees:** Chir (Pine) is the main tree but Oak, Jamun and Rhododendron are also found in these forests.



- **Mangroves in India:** In India, the mangrove forests spread over 6,740 sq. km which is 7% of the world's mangrove forests.
- Sunderbans along the Ganges delta is the largest tidal forest in the world.



Forest Survey report 2021

- It is the 17th biennial assessment of India's forests by the Forest Survey of India, an organisation under the Ministry of Environment, Forest and Climate Change (MoEFCC).
- The ISFR 2021 presents the latest status of the 'Forest cover' and 'Tree cover' of the country, estimates of growing stock, the extent of trees outside forests, mangrove cover, bamboo resources, and assessment of forest carbon stock.
- Minister informed that the total forest and tree cover of the country is **80.9 million hectare which is 24.62 percent of the geographical area of the country**. As compared to the assessment of 2019, there is an increase of 2,261 sq km in the total forest and tree cover of the country.

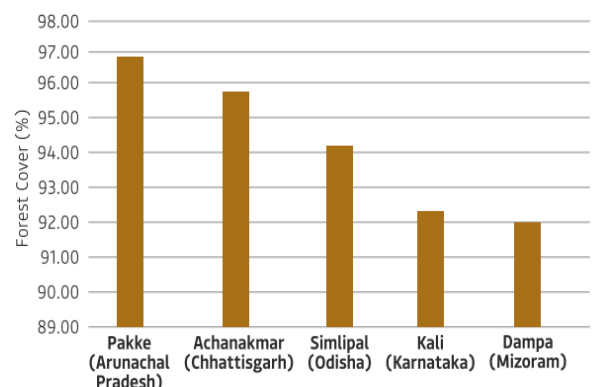
Key Features of India State of Forest Report, 2021

- The report is based upon the survey of three types of forests namely,
- Very Dense Forests (having canopy density more than 70%)
- Moderately Dense Forests (having canopy density between 40% and 70%)
- Open Forests (having canopy density between 10% and 40%)
- Where canopy density is less than 10%, the region is categorised as "scrubs" instead of "forests", yet the area is still surveyed

New Features of India State of Forest Report, 2021

- The report and the survey for the first time ever have included Gir Forest (only habitat of Asiatic Lions), Tiger Reserves, and Tiger Corridors.
- Following tiger reserves have experienced gain in forest cover:
 - Buxa Tiger Reserve (West Bengal)
 - Indravati Tiger Reserve (Chhattisgarh)
 - Anamalai Tiger Reserve (Tamil Nadu)
- Following tiger reserves have experienced loss in forest cover:
 - Kawal Tiger Reserve (Telangana)
 - Bhadra Tiger Reserve (Karnataka)
 - Sunderbans Tiger Reserve (West Bengal)
- As for the percentage of total forest cover to area, the Pakke Tiger Reserve of Arunachal Pradesh has shown the best record with as much as 97% forest cover.

- Wetlands: The 5,821 wetlands cover 7.20% of the total area of the Tiger reserves.
- The Sundarban Tiger Reserve has the largest area under wetlands accounting for 96.76% of its total area.
- Kanha Tiger Reserve has the highest number of wetlands, 461 wetlands.



Increase in Forest Cover/Tree Cover

- 17 states/UT's have above 33 percent of the geographical area under forest cover.
- Maximum increase in forest cover witnessed in Andhra Pradesh (647 sq km) followed by Telangana (632 sq km) and Odisha (537 sq km).
- Area wise States with Highest Forest Cover/Area:
 - Madhya Pradesh continues to have the highest area under forest cover in India and is preceded by other states such as Arunachal Pradesh, Chhattisgarh, Odisha, and Maharashtra.
- Percentage of Area wise States with Highest Forest Cover/Area:
 - Mizoram leads this category and is preceded by other states such as Arunachal Pradesh, Meghalaya, Manipur, and Nagaland.
- Mangrove forests in India have shown an overall increase of 17 sq. km.
- Bamboo forests in India have also registered a growth of approximately 26% from 2019 to 2021.
- Area under "Very Dense Forests" has shown an increase of approximately 500 sq. kms.
- Total Carbon Stock: The total carbon stock in forests is estimated as 7,204.0 million tonnes an increase of 79.4 million tonnes since 2019.
- Maximum gain in Forest Cover is seen in Hyderabad followed by Delhi while Ahmedabad and Bengaluru have lost Forest Cover.
- States showing loss in forest cover: Arunachal Pradesh > Manipur > Nagaland > Mizoram > Meghalaya.

Top ten countries for average annual net gain in forest area (2010-2020)

Sl. No.	Country	Annual Forest Area Gain	
		Area (000 ha)	% of 2010 forest area
1.	China	1,937	0.93
2.	Australia	446	0.34
3.	India	266	0.38
4.	Chile	149	0.85
5.	Vietnam	126	0.90
6.	Turkey	114	0.53
7.	USA	108	0.03
8.	France	83	0.50
9.	Italy	54	0.58
10.	Romania	41	0.62

- **Status of Mangrove Cover Worldwide:** As per Global Forest Resource Assessment, 2020 (FRA 2020), the world over, 113 countries have Mangrove forests covering an estimated 14.79 million hectares.
- The largest Mangrove area is reported in:
- Asia > Africa > North and Central America > South America.
- Oceania has reported the smallest area of Mangroves.
- More than 40% of the total area of Mangroves was reported to be in just four countries: Indonesia (19%), Brazil (9%), Nigeria (7%), and Mexico (6%).

Practice Question

1. Which of the following forest that are found in the Western Ghats, hills of the north eastern region and the Andaman and Nicobar Islands.

- A. Mangroove Forest
- B. Dry deciduous Forest
- C. Tropical Evergreen Forests
- D. Semi-desert and desert vegetation

2. India State of Forest Report' has been published by? *

- a. MoEFCC
- b. FSI
- c. NITI Aayog
- d. None of the Above

Ministry for Environment, Forest and Climate Change released the ISFR Report i.e. 'India State of Forest Report '.

3. Forest cover has maximum increased in which state according to the FSI? *

- a. Maharashtra
- b. Karnataka
- c. Telengana
- d. Andhra Pradesh

4. How much total geographical area covered by forest and tree in India according to FSI 2021 *

- a. 80 million hectare
- b. 80.5 million hectare
- c. 80.9 million hectare
- d. 81.1 million hectare

5. In which state of India, area-wise highest forest covered according to Forest Survey of India 2021? *

- a. Maharashtra
- b. Madhya Pradesh
- c. Arunachal Pradesh
- d. Chhattisgarh

6. How much area increased in mangrove forest according to Forest Survey of India (FSI) 2021? *

- a. 13 sq km
- b. 15 sq km
- c. 17 sq km
- d. 19 sq km

7. The first ISFR report published in *

- a. 1972
- b. 1987
- c. 1992
- d. 1997

8. ISFR 2021 is *

- a. 15th Report
- b. 17th Report
- c. 19th Report
- d. 21th Report

9. Which one of the Indian state have more than 75% of geographical area under forest cover? *

- a. Nagaland
- b. Manipur
- c. Arunachal Pradesh
- d. Madhya Pradesh

10. ISFR published is a/an *

- a. Annually
- b. Biennial
- c. Every Three Year
- d. Five Yearly

11. In which state of India, in percentage highest forest covered according to Forest Survey of India 2021? *

- a. Arunachal Pradesh
- b. Meghalaya
- c. Mizoram
- d. Nagaland

12. Who prepared 'ISFR report'? *

- a. FSI
- b. MoEFCC
- c. NITI Aayog
- d. FPI

Answers

- 1. Ans: c
- 2. Ans: a
- 3. Ans: d
- 4. Ans: c
- 5. Ans: b
- 6. Ans: c
- 7. Ans: b
- 8. Ans: b
- 9. Ans: c
- 10. Ans: b
- 11. Ans: c
- 12. Ans: a